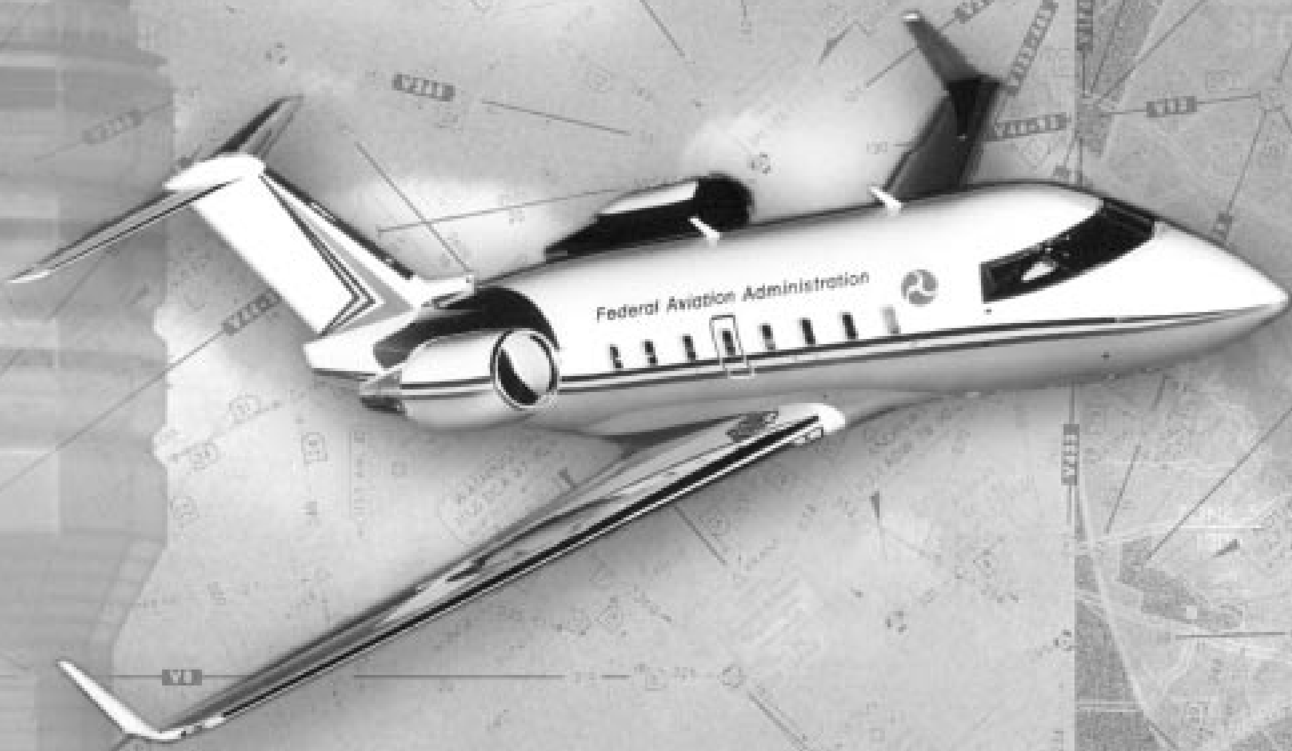
Air Traffic Service Plan



2000-2004

PREFACE

It is my pleasure to introduce the 2000 edition of the Air Traffic Service Plan. The focus of this document continues to be enhancements to our baseline level of service. Only through collaborative planning and discussion with our customers will we be able to meet their requirements and expectations for service in the National Airspace System.

Over the last six months, we have placed extraordinary effort on planning for the Spring/Summer 2000 Traffic Management Initiative. As this document goes to press, we have already begun an active Summer weather season. Clearly, as we look to the future, we need accurate and timely now-cast and forecast products to better mitigate the negative impact of weather on the efficient management on the National Airspace System.

Besides the evolution in Air Traffic management methods, we are seeing a more diverse population of NAS users. Vehicles traveling to and from earth orbit are operating more frequently and from more locations. Until recently, most of these launches were made under the auspices of space exploration and national security. Now, more and more of these vehicles are supporting commercial enterprises. We also anticipate a growing use of remotely operated aircraft for commercial purposes after 2005. I would like to hear your suggestions about how we can develop policies to equitably share our national airspace resource among an increasingly complex group of commercial and pleasure users.

We in the Air Traffic organization reaffirm our dedication to meeting your need for safe, efficient, timely, and innovative services. We appreciate your past cooperation and support in effecting system improvements, and we look forward to your cooperation in developing and implementing additional improvements.

Ronald E. Morgan
Director of Air Traffic

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INTRODUCTION

This fifth edition of the ***Air Traffic Service Plan*** reaffirms the responsibility of the FAA's Air Traffic organization (AAT) as a service provider to users of the National Airspace System (NAS). It represents collaborative efforts between service providers and customers to improve current air traffic services and to influence the nature of future services.

For the first edition, we in Air Traffic surveyed our many, diverse customers, and developed a catalogue of their needs. We used these needs to form strategies that would best satisfy our customers' requirements. Subsequent editions reflected the evolution of needs and strategies, and sustained and energized the dialogue between the Air Traffic organization service providers and their customers. This edition of the ***Air Traffic Service Plan*** remains true to its original purpose of fostering collaboration between service providers and customers. It is our report on the progress we are making to improve NAS safety, security, and efficiency.

Organization and Scope of the Air Traffic Service Plan

We recognize that the audience for the ***Air Traffic Service Plan*** includes both external customers and internal air traffic service providers. You will find the information arranged into four principle sections: "Serving Our Customers' Needs," the "Catalog of Customer Needs," "Services," and "Action Plans."

> **"Serving Our Customers' Needs"** discusses the relationship between the Air Traffic organization and our customers. The plan begins with a discussion of Air Traffic's customers. It continues by explaining how our customers' needs were identified.
>
> The **"Catalog of Customer Needs"** is the foundation for the on-going collaboration between Air Traffic and its customers. Air Traffic's goal is to meet these needs as fully as possible.
>
> The **"Services"** section shows how the services Air Traffic provides to NAS users relate to the categories of services desired by users. The section then highlights the initiatives undertaken by Air Traffic to improve customer service by highlighting both current and future initiatives.
>
> The final section, **"Action Plans,"** explains how the initiatives described in the "Services" section are fulfilling Air Traffic's performance targets. This section links this ***Air Traffic Service Plan 2000-2004*** to the ATS Performance Plan for Fiscal Years 2000-2002.

The planning horizon for the ***Air Traffic Service Plan*** extends from the present out to about five years. It is important to identify actions that can be taken in the near term because they show responsiveness and influence the evolution of operational concepts extending beyond this plan's five-year time frame. Focusing on near-term actions ensures that the aviation community can experience some early benefits in advance of long-term system improvements.

While the Air Traffic organization is concentrating on near-term changes, it is also looking at the procedural, automation, and infrastructure improvements that would allow even greater changes to eventually be made in the way air traffic services are provided. Of course, where the development of new technologies is concerned, the planning horizon may be longer. But even in these cases, we will take a more proactive role in working with the development and acquisition communities to ensure that the FAA does a better job of delivering sooner than it has in the past.

As you read the ***Air Traffic Service Plan*** remember that it is not being developed in a vacuum. Air Traffic ensures that this plan remains in consonance with other significant activities that are occurring. Air Traffic supports the *Air Traffic Services Performance Plan* and the *FAA Strategic Plan*, and is responsible for meeting the goals and objectives in those plans. Air Traffic also helps to establish the priorities influencing investment decisions and procurement activities. The programs and procedural enhancements described in the ***Air Traffic Service Plan*** are the practical results of these strategies.

SERVING OUR CUSTOMERS' NEEDS

Air Traffic's Customers

Customer needs drive the development of the services and supporting operational capabilities we use to satisfy those needs. To understand our customers needs, we, the members of the Air Traffic organization, must know who our customers are and what services they need.

Planning efforts prior to the first ***Air Traffic Service Plan*** focused on evolving the Air Traffic Management (ATM) system to better serve the human operators in the system. Using this paradigm, services provided by the communications, navigation, surveillance, and automation infrastructure of the ATM system were oriented toward controllers and specialists.

The ***Air Traffic Service Plan*** changes that paradigm by viewing the users of the NAS as our customers. Skilled controllers and system specialists are coupled with the Air Traffic Management Infrastructure. Together they form a foundation for the services Air Traffic provides its customers.

Air Traffic's services are directed primarily at the organizations and individuals that plan or monitor aviation operations and those who fly in the National Airspace System. They include (but are not limited to):

- Air carriers of passengers and freight, both domestic and international;
- General aviation including air taxi, commercial, business, public, and pleasure flyers;
- Military entities;
- Pilots of commercial, private and military flights;
- Rotorcraft;
- Space launch and recovery organizations; and
- Operators of remotely operated aircraft (ROA) and unmanned aerial vehicles (UAV).

The Air Traffic Management System

Air Traffic's customers have diversified objectives and goals. Even within the same broad category—such as air carriers—there are many different operating paradigms and objectives. As the primary provider of services to this multi-faceted group, Air Traffic listens to everyone's needs, balances them, and then collaborates with the customers to satisfy those needs using the best options available.

This plan defines improvements and enhancements that will provide the services needed by the customers of the Air Traffic Management system. Furthermore, we believe that the level of service provided to our customers is directly related to the types and levels of services provided to the controllers, specialists, and other human operators.

Customer Needs

For many years, customers and their representative groups have been working with Air Traffic and other FAA organizations to express their needs and priorities. The ***Air Traffic Service Plan*** captures this information and organizes it to present a guide to those needs that must be addressed in the next five years.

Consistent with the previous editions of the plan, we used a two-pronged approach to identify the needs. First, we reviewed the customer needs collected from the aviation community through various forums and through information exchange activities. Included in this process were interviews with personnel from air carriers, general aviation, military, associations and FAA Regional offices and facilities. These activities and sources included ones used in the previous versions of the plan and resources listed in the Bibliography section.

The second part of the approach was to convene a group of organizations and individuals to participate in a roundtable discussion of needs and priorities. This group included representatives of Air Traffic's customer base—air carriers, private and business aircraft operators, military aviators, aircraft and avionics manufacturers, representatives of the unions, and members of the Air Traffic headquarters and regional offices. The Customer Roundtable has been an annual event since 1995.

Past roundtables have fostered a spirit of collaboration between the Air Traffic organization and the customers it serves, and have led to the implementation of important operational improvements. For example, a key accomplishment directly attributable to the Customer Roundtable[1] process was the introduction of a conflict probe capability—a pillar of the Free Flight concept in an operational setting at Indianapolis Air Route Traffic Control Center.

[1] At the 1999 Roundtable, Ron Morgan, the Director of Air Traffic, changed the name of the annual gatherings from "User" to "Customer" Roundtables.

The result of the effort to understand our customers needs is found in the “Catalog of Customer Needs.” The Catalog is reproduced in the following section **using customers’ own words**. It is divided into the following five broad categories of customer needs:

- Processes and Decision Making
- Information Exchange
- Separation Assurance
- User Operational Efficiency
- System Access

“Process and Decision Making” includes those needs associated with the interactions between Air Traffic and its customers and how they share decision-making responsibilities. “Information Exchange” includes needs associated with Air Traffic’s role in receiving, providing, and transmitting information. This category includes the operational decision-making processes that are associated with information exchange on a daily and / or tactical basis.

“Separation Assurance” includes those needs associated with separating aircraft in the air and on the ground. There are significant human factors issues associated with the Information Exchange and Separation Assurance categories. The last two categories, “User Operational Efficiency” and “System Access,” include those needs associated with the manner in which Air Traffic affects the resources of its customers and their access to NAS resources.

The following section contains the “Catalog of Customer Needs.” The subsequent section, “Services,” describes the services Air Traffic provides that are the conduit for satisfying those needs. “Action Plans,” the last section, shows how Air Traffic’s initiatives are part of the larger FAA strategic planning process.

CATALOG OF CUSTOMER NEEDS

Process and Decision-Making

- More collaborative decision-making. Where feasible, customers should make decisions that are associated with their operations. The FAA should make decisions associated with their resources. If not involved directly in making decisions, a bigger part in influencing decisions (input data, submit multiple options, receive system view) is desired.
  - Let operators decide which flights to operate in restricted periods
  - Increase input in decision-making associated with noise abatement procedures that may cause unnecessary fuel use
  - Increase user input into airspace redesign decisions
- Along with a bigger role in operational decision-making, customers seek a more active role in decision-making associated with system development (especially those decisions requiring new equipage); Want input into prioritization of new technology/equipment installation and use
- More cross training between the FAA and customers
- Decisions supported by modeling and analysis
- Need to ensure proper “buy-in” from all stakeholders who will be affected by planned capacity enhancements
- Greater inclusion of non-traditional customers such as helicopters and unmanned vehicles in decision-making processes
- Continued, sustained improvement in interaction with customers at all FAA levels (Headquarters, Regional, Facility levels)

Information Exchange

- Receipt of timely, accurate and reliable information from Air Traffic for more efficient operations
  - More interactive briefings for flight service
  - Improved NOTAM system
- Real-time reliable communications with Air Traffic Control (ATC) for flight information and planning service
- Delivery of safety critical information and instructions to pilots with minimal delay and error. Reduce frequency congestion

- Improved usability of weather data products through more applicable formats (i.e., graphic versus verbal)
- Ensure standard, consistent information representation for both pilot and controller
- Improvements to standard phraseology between pilots and controllers
- Access to information that can be used to determine optimal flight plan or to modify an active flight plan based on user criteria
  - Access to dynamic database of runway capacity and airborne demand
  - Access to information about routine/recurrent capacity overloads at NAS resources (i.e., sectors)
  - Access to accurate route oriented products (i.e., route oriented weather products, accurate positioning data, situational awareness products, etc.)
  - Access to information on system activity: flight progress, current and forecasted demand and capacity, associated weather data
- Position updates in the terminal area
- Position reports of potential conflicting traffic
- Oceanic position reports
- Real-time airport configuration (active runways) and arrival acceptance rates
- Weather data integrated with Traffic Situation Display (TSD)
- Real-time information on en route restrictions
- Real-time information on Severe Weather Avoidance Program (SWAP) routes in use
- Real-time indication of saturated sectors
- Real-time information on the availability of Special Use Airspace (SUA) for civil aircraft
- Access to basic information needed to ensure access to system resources and safe operation of flight
  - Reliable and continuous access to navigation information for all classes of users
  - Runway Visual Range (RVR) data
- Access to and improved knowledge of extent and severity of weather by ATC and pilots; increased access to real-time weather data
- Real-time knowledge of wake vortices and wind shear
- Better predictive accuracy of weather information
  - Improved observation/detection of convective activity and icing levels
- Better access to data to improve situational awareness and to support low visibility movement on airport surface
  - Knowledge of position of obstacles, vehicles, and other aircraft
  - Better information about the proximity of intruders (birds, balloons, non-beacon-equipped aircraft)
- Continued improved communications with ATCSCC and Traffic Management personnel
- Provide customers with faster access to real time data from ATCSCC

Separation Assurance

- Rapidly identify conflicts, propose solutions, and communicate recommended actions
  - Separation monitoring
  - Resolution of detected conflict
- Assure safe separation of aircraft on the ground with as much discipline as aircraft in the air
- Address human factors issues associated with changing human role in air traffic management
  - Assure safe separation of aircraft (from other aviation and space vehicles, obstacles, and weather) in the more complex operating environment of free flight

User Operational Efficiency

- Grant customers the ability to select and fly an optimal route at their desired departure and arrival times; fly at desired times, at desired speeds, and on desired tracks and trajectories
  - Dynamically update flight plans in response to changing environment
  - Give full recognition of individual aircraft performance
- Expansion of automated decision support tools for improved NAS efficiency
- Greater control of ATCSCC over field facilities to function as a system rather than separate entities
- Allocate delays equitably among all operators
- Implement fuel savings techniques in day to day operations
  - Increased utilization of Flight Management System (FMS) to fly the best fuel economy route
  - Minimal vectoring below 10,000 feet
  - Elimination of procedures that involve speed restrictions below 10,000 feet
- Maximize use of available equipage to minimize additional avionics costs
- Reduce ground and en route delays
  - Eliminate delay producing TFM actions/restrictions, such as, static and dynamic miles-in-trail
- Reduce the size of the separation bubble in all U.S. airspace
- Ensure access to system for Department of Defense (DoD) mission critical operations (e.g., training)
- Ensure FAA staffing to support new technology and equipment
- Reduced Vertical Separation Minima (RVSM) in all U.S. airspace

System Access

- Increase ATC-related airport capacity
- Maintain the reservoirs of airborne demand during flow control
- Base traffic flow restrictions only on the runway occupancy limitations and availability
- Maintain visual landing rate in all ceilings and visibility conditions
  - Expand use of simultaneous operations on intersecting runways
- Maintain visual surface movement rate at all visibility conditions, except hazardous weather conditions
- Precision approach guidance to all runway ends normally served
- Time-based sequencing and scheduling
  - Time sequencing to a merge point closer to runway
  - Automated sequencing and metering
- Maximize use of SUA-when appropriate and in the mutual best interest-for civil aircraft on a real-time basis
- Promote use of joint-use and reliever facilities
- Review and update airfield, facilities, and equipment requirements for airports; promote and encourage greater use of modeling in national airport planning
- Consistent and prompt action with respect to airspace redesign to allow for more optimal use of airspace for all users
- Increase hours of operation at part-time Airport Traffic Control Towers
- Improve access and information to non-air carrier customers
- Ensure access to the system for DOD mission critical operations e.g. practice scrambles

SERVICES

Overview of Services

Air Traffic strives to satisfy its customers' needs by providing safe, efficient, timely, and innovative services to present and future NAS users. We continue to develop improved methods for measuring our effectiveness in meeting customer needs. The following services also form the basis for our investment decision criteria, cost accounting, and financial management information. Below, we identify the services provided by the ATS organization:

- **Primary Operational Services** are most visible to the end user and comprise the largest investment of Air Traffic human and equipment resources. They include:
  - Separation assurance
  - Traffic management
  - Aviation information
  - Navigation
  - Landing
- **Management of National Resources Services** and the resources they manage are largely transparent to the aviation system user. Nonetheless, they are critical to safe and efficient flight. As custodians of the national airspace, our role is to protect, justify, and plan for the efficient use of these finite resources. The services we provide in this area include:
  - Airspace management
  - Spectrum management
- **Other Services** not directly related to air traffic control but equally vital to our customers, include:
  - Search and rescue
  - Aviation assistance services

To more clearly show the match between customer needs and our services, we will present the service improvements within the same "service category" format we used in the "Catalog of Customer Needs" section. The remainder of this section is organized around the five service categories. Within the description of the service improvement for each category, you will find:

- A description of the services our customers desire,
- An explanation of how those services are provided in the system today, and
- A description of the procedural improvements and programs Air Traffic is developing to improve its customer service.

From our dialogue with our customers, we developed the "Catalog of Customer Needs" presented earlier. We learned, for instance, that our customers would like to receive additional pertinent and timely information on a "real-time" basis. They want to use that information to make their own informed decisions. The next subsection describes initiatives underway to meet the need for improved processes and decision making.

PROCESSES AND DECISION-MAKING

Customer Desired Services

Decision-making and the processes associated with those decisions are the keys to the safe and efficient operation of the NAS. Many important decisions focus on the central concern of how to manage and allocate not only the NAS resources, but also the resources of the aviation system customer. Air Traffic customers are pleased with the FAA's improved efforts to grant them more direct involvement in decision-making associated with their operations and with the use of resources within the NAS. This includes ensuring the appropriate involvement of all stakeholders who will be affected by evolving capacity adjustments, and allowing customers to have a more active role in the early stages of decision-making associated with system development.

Collaborative strategic planning is the way of the future. Air Traffic is striving to meet customer needs by fostering and facilitating a collaborative decision-making environment. By soliciting and using customers' suggestions in all levels of decision-making and by sharing information that customers need to make informed decisions, Air Traffic aims to minimize potential disagreement over new programs and procedures.

Assessment of the Current System

Air Traffic has continued to expand its efforts to employ a collaborative method for making decisions that affect customer operations. This collaborative method ensures customers have more control over their own operations and the use of their own resources. At the national level, the Director of Air Traffic hosted the sixth annual **Customer Roundtable** in April 2000. The Customer Roundtable brings together major stakeholders from throughout the aviation industry to discuss issues concerning the delivery of services by the Air Traffic organization and to identify ways in which the FAA and NAS users can better coordinate their efforts to improve system efficiency and safety.

An essential component of Air Traffic's commitment to collaboration with the aviation industry has been the continuation of the well-regarded **Air Traffic Customer Advocate** position. The customer advocate works with the Director of Air Traffic to ensure that the Air Traffic organization is closely attuned to customer needs and concerns. The customer advocate has extensive experience with air traffic control functions at all levels and provides full-time attention to issues raised by the customers.

FAA regional offices and Air Traffic Facilities continue to sponsor interactive forums where customers are invited to participate in the decision-making processes that will have an impact on their operations. These forums often address both immediate and long-term local needs. In June 1999 and 2000 the FAA's Northwest Mountain and Western Pacific Regions, together with the Air Transport Association of America (ATA), jointly hosted the annual "West Coast Air Traffic Control Users' Forum" in Reno, Nevada. This popular "mega" users' forum brings FAA personnel and NAS users together to focus on cooperation between the airspace provider and the users and how that relationship translates to greater efficiency and a higher level of safety.

In addition, the Air Traffic organization holds recurrent meetings with the aviation industry to discuss critical issues such as national airspace redesign and runway safety. These interchanges foster greater understanding of the customers' operational needs and concerns. Through this collaborative process, operational procedures are developed, refined, and implemented.

The FAA Eastern Region Operations division holds quarterly **Capacity Enhancement Task Force (CETF)** meetings with customers and FAA personnel at the major airports in the region to maintain an open dialog on issues such as expansion of East Coast oceanic airspace, access to the overhead stream and special use airspace, expansion of automation tools, runway use and incorporation of redesigned helo routes and procedures, among other topics.

The **Gulf of Mexico Working Group (GOMWG)** was formed by the Southwest Region Air Traffic Division in 1998. Co-chaired by the FAA, the Air Transport Association, and Mexico's Air Traffic Services Corporation, SENEAM, the GOWMG meets approximately every two months. More than 45 organizations representing the military, air carriers, oil production helicopters, labor organizations, the fishing industry, general aviation, and other system users contribute the ideas and initiatives that will shape the Gulf of Mexico ATC operating environment for the foreseeable future. The GOMWG Strategic Plan, a consensus-based planning document, is in final draft and should be published in Summer 2000.

The **Oceanic Working Group (OWG)** is another example of FAA/Industry collaboration. Co-chaired by the FAA and the Air Transport Association, the OWG meets regularly to allow system users to provide input to the FAA concerning planned technological and procedural enhancements in the Pacific Oceanic operating environment. Supported by a cross section of the national and international aviation industry, the OWG's ongoing work involves improvements to safety, efficiency, and capacity in the Pacific Region.

In November 1999 the FAA convened the first **General Aviation Users Summit** in Washington, D.C. The summit brought together flight service system customers and representatives from FAA labor and management to examine policy, procedures, and infrastructure as it is today and to make recommendations regarding changes needed to meet current and future system needs. Participants focused primarily on customer needs in the areas of pilot weather briefings and international flight services. A follow-up summit took place in May 2000 to review actions items identified in the *Summit Action Plan*, and to formulate implementation strategies. An implementation plan will be distributed by October 2000.

Air Traffic continues to play a major role in the evolution to **Free Flight** and NAS modernization. As a vital member of the RTCA Free Flight Steering Committee and the Free Flight Select Committee, Air Traffic is working with the user community on **Free Flight Phase-1** (FFP1), a comprehensive set of decision support tools and recommendations for a critical portion of NAS modernization. FFP1 is a plan for the delivery, implementation, and evaluation of a core set of operational capabilities that will deliver benefits to users in a timely manner.

The core capabilities of FFP1 are summarized below and discussed in more detail in the remainder of this document:

- The **User Request and Evaluation Tool (URET)**. The URET capability enables controllers to better manage user requests in en route airspace through early identification of potential conflicts. It provides the controller with a decision support tool that can lead to fewer altitude and speed restrictions, which will increase direct routings and reduce the amount of en route miles flown.
- **Center TRACON Automation System (CTAS)**. Two defined elements of CTAS that are included in FFP1 are:
  - **Traffic Management Advisor (TMA)**. TMA provides en route controllers, terminal controllers and Traffic Management Coordinators (TMC) with decision support to develop smoother arrival and departure sequence plans, optimizing runway usage.
  - **Passive Final Approach Spacing Tool (pFAST)**. pFAST maximizes runway utilization by providing terminal controllers with aircraft sequence numbers and runway assignments according to user preferences and system constraints. pFAST will also provide improved safety through better controller situational awareness.
- **Collaborative Decision Making (CDM)**. Collaborative decision-making comprises a number of different initiatives to help users and service providers make better decisions. CDM enables TMC's at the David J. Hurley Air Traffic Control System Command Center (ATCSCC) and at the ARTCCs to share real-time traffic flow information among themselves and with participating airline operation centers (AOC), and General Aviation (GA) users. It involves the sharing of NAS status information including weather, equipment, and delays.
- **Surface Movement Advisor (SMA)**. SMA is a tool that provides real-time aircraft position information from ARTS III radar data. It provides aircraft arrival information (including identification and position in terminal airspace) to airline ramp towers. SMA will result in more efficient coordination and enhanced management of ground support services.

Air Traffic teamed with other government and industry representatives in August 1998 to build on the core Free Flight document, *The Government/Industry Operational Concept for the Evolution of Free Flight (1997)*. The group developed two addenda: *Addendum One: Free Flight Phase-1, and Addendum 2: Near Term Procedural Enhancement Core Capabilities Limited Deployment*. This supplemented operational concept covers the near-term through 2002, during which the FFP1 capabilities are being deployed to selected locations. This document is to be used by both government and industry to make the procedural, investment, and architecture decisions necessary to achieve free flight in a coordinated, collaborative manner.

Under the reconstituted RTCA Special Committee (SC) 192, National Airspace Redesign Planning and Analyses, Air Traffic plays an active role in national airspace review planning and analysis. The committee, comprised of Air Traffic and the aviation industry, collaborates to make changes to the airspace of the national airspace system in order to bring enhancements to the NAS.

SC 192 has formed three working groups that reported findings in June 2000. Working Group-1 has been holding public meetings across the United States to obtain input on user priorities for the National Airspace Redesign. Working Group-2 is testing new procedures and technologies for managing Special Use Airspace (SUA) sites in Florida and Texas and will make recommendations on SUA in the National Airspace Redesign. Working Group-3 is writing, from the perspective of airspace users, a review of the proposed next edition of Federal Aviation Administration Order 7400.2, *Procedures for Handling Airspace Matters*.

As part of its plan to redesign the airspace in the New York area, the Eastern Region sponsored more than 30 community meetings in New York, New Jersey, and Connecticut. During each meeting FAA representatives presented the reasons for airspace redesign and explained some of the changes they are evaluating. FAA personnel then provided citizens with the opportunity to register their response to the proposals.

In response to a community request, Air Traffic's Airspace Management Program Office sponsored an analysis of current routings and alternative offshore routings for departures from Los Angeles International Airport. That analysis has been completed and is awaiting public comment.

The Air Traffic organization takes an active interest in NAS performance. In November 1999, the Acting Deputy Administrator, the Director of Air Traffic and FAA personnel met with various air carriers and the ATCSCC to discuss ways in which the airlines could evaluate Air Traffic's services. They agreed to expand the airport utilization data being provided to the airlines from 10 airports to 21 airports. For their part, the airlines agreed to provide specific arrival and departure data — **"Out to Off, On to In" (OOOI)** information — to Air Traffic in order to measure its own performance in near real time. Scheduled flight information and OOOI data from ten air carriers is combined with runway and arrival/departure configuration data from the ATCSCC in a common database accessible by the airlines and FAA management. Discussions on further utilization of the data (i.e. trend analysis) were held in spring 2000.

The FAA and its National Airspace System customers agreed, after an unexpectedly harsh severe weather season and unprecedented delays during summer 1999, to work together to identify and implement operational improvements to enhance system performance. There was unanimous agreement that the foundation for avoiding the system delays that plagued the industry was the development of a daily strategic planning process. Thus, the FAA/Industry **Spring/Summer 2000** initiative was created.

Spring/Summer 2000 establishes a daily collaborative planning process for the NAS, with special emphasis on severe weather planning. FAA and NAS operators are committed to providing the staffing and resources required to participate in each facet of the plan development. The FAA has committed to ensuring FAA facilities' accountability and NAS operators have agreed to adhere to the plan. Air Traffic believes these initiatives are just a first step in an evolutionary process that, when fully implemented, will significantly benefit the consumers. The strategic planning process began on March 12, 2000 and has no end date.

Air Traffic adopted a collaborative paradigm for developing and deploying new automation tools and decision aids to enhance safety, reduce delays, and increase efficiency. The **Standard Terminal Automation Replacement System (STARS)**, the **Display System Replacement (DSR)**, and the **passive Final Approach Spacing Tool (pFAST)** are three of the integral components of this effort. Teams that included members of FAA field facilities, FAA development organizations, the National Air Traffic Controllers Association, and the Air Traffic organization were formed to expedite these programs.

Safe Flight 21 is a government and industry cooperative effort to demonstrate and evaluate, in a real world environment, a set of free-flight operational enhancement capabilities derived from evolving communication, navigation, and surveillance (CNS) technologies to improve safety, efficiency, and capacity. The program is the result of customer recommendations to focus on specific operational enhancement capabilities, including: Flight Information Services (FIS) for SUA status, weather, wind-shear, Notice to Airmen (NOTAM), Pilot Reports (PIREP); cost effective controlled flight into terrain (CFIT) avoidance through graphical position display; improved terminal operations in low visibility conditions; enhanced "See and Avoid;" enhanced operations for en route air-to-air; improved surface navigation; enhanced airport surface surveillance for the controller; **Automatic Dependent Surveillance–Broadcast (ADS-B)** for surveillance in non-radar airspace; and ADS-B-based separation standards.

The Safe Flight 21 initiative focuses on quantifying and assessing benefits, and then determining if the beneficial enhancements will be economically and technically feasible. More specifically, the program objective is to show that the sharing of real-time traffic and weather information between pilots and the controllers will enhance and expand operational capabilities. Key technologies for the program include the application of the **Global Positioning System (GPS)**, the use of **ADS-B**, the cockpit display of terrain database to prevent controlled flight into terrain, and **Traffic Information Services (TIS)**, and their integration with enhanced pilot and controller information displays. Demonstrations of these technologies are planned in two areas: working with the Cargo Airlines Association (CAA) at their hub locations in the Ohio River Valley and working with commercial carrier aircraft and general aviation in Bethel, Alaska.

In July 1999 the FAA and the CAA conducted the first of five planned operational evaluations of ADS-B/CDTI in the Ohio River Valley at Wilmington, Ohio. The metrics from this evaluation will be available mid-2000. Additional evaluations are scheduled for Louisville, Kentucky in November 2000 and for Memphis, Tennessee in 2001.

The Alaskan **"Capstone Program"** will conduct evaluations to determine the safety impact of these technologies. Capstone has begun to equip up to 150 commercial carrier and general aviation type aircraft that operate in the remote area of Bethel, Alaska. ADS -B ground stations are being installed at 13 locations. These ground stations will be used to transmit ADS-B signals to the Anchorage ARTCC to be displayed on the controller Micro-EARTS displays. The Micro-EARTS will be modified to display ADS-B targets by August 2000. This will support providing radar-like service to Bethel, which is located in non-radar airspace, by January 1, 2001. Evaluation of the avionics to support CFIT avoidance and increased awareness of other aircraft and ground vehicles will be ongoing.

By the year 2005, the largest percentage increase in air traffic is projected to occur across the Atlantic and Pacific Oceans. To accommodate this growth, improvements in navigation, communication, and surveillance are needed. The **Advanced Technologies and Oceanic Procedures (ATOP) Program** is a collaborative Air Traffic/customer effort to provide automation to the oceanic center areas (Oakland, Anchorage and New York). The ATOP team is working actively with the National Air Traffic Controllers Association (NATCA) and users to determine what their “vision” of the future will look like as they seek a product that will integrate the various oceanic systems, reduce delays, and support the use of fuel-efficient routes while managing the growth in traffic.

Future Direction (2000-2004)

All levels of the FAA will continue to collaborate with customers to develop a common strategic vision for the NAS. This will include the Director of Air Traffic hosting the annual Customer Roundtable, FAA regional offices hosting meetings and customer forums, and the Air Traffic Customer Advocate meeting with various customer organizations to discuss the quality of air traffic services.

Air Traffic will continue its critical role in developing and implementing procedures and capabilities that support free flight. The FFP1 core set of operational capabilities is on schedule to be deployed at a limited number of sites through the end of 2002. Continuous performance evaluations (benefits to the customers) will be conducted. **Free Flight Phase 2 (FFP2)** will build on the success of the FFP1 program and introduce new capabilities from 2003 through 2005. Under FFP2, the Phase 1 elements will be expanded geographically with several new capabilities being deployed, including **Collaborative Routing Coordination Tool (CRCT)** and **High Altitude Airspace Concepts (HAAC)**.

Likewise, RTCA SC 192 will focus on national airspace redesign and planning by providing concepts and recommendations from airspace users.

Air Traffic will also strive to coordinate with the user community on the direction of and plans for the **Safe Flight 21** initiative. Safe Flight 21 goals for FY 00 are set and focus on five activities: procurement and installation of ground stations, operational evaluation planning, building FAA-wide support, building aviation community support, and executing the evaluation. In addition, **Capstone** is funded for $11 million for FY 00. This provides the avionics for the air and ground infrastructure designed to improve safety and efficiency. Results from the impact of this equipage on flying safety and efficiency will be gathered FY 00-01. Based on these results, limited statewide implementation will begin in FY 02.

As experience is gained in managing the system, the **Spring/Summer 2000** program will be continually adapted as lessons learned are applied and incorporated. The program will undergo review after the first SWAP season and will be revised as needed.

INFORMATION EXCHANGE

Customer Desired Services

All Air Traffic customers, from general aviation pilots to major air carriers, must receive safety critical information and instructions with minimal delay. They also need access to information that is current, accurate, relevant to operational objectives, and easily understood and applied. They do not want to be overwhelmed with unprocessed data or hampered by a poor user interface, especially in a busy flight deck or operations center environment.

Air Traffic's customers also need ATM system information, such as current and forecasted demand and capacity, Special Use Airspace (SUA) status, reroutes when necessary and Estimated Departure Clearance Time (EDCT). They require real-time weather data including the extent and severity of weather and severe weather avoidance information. They need more accurate forecasts and detection of convective activity and icing levels. And, all Air Traffic customers must have continuous, reliable access to navigation information, with minimal delay and no error, for safe flight operations.

Assessment of the Current System

Air Traffic has renewed its efforts to share tactical planning information for **Collaborative Decision Making (CDM)** with its customers. The **Collaborative Decision Making Network (CDMnet)** provides a "pipeline" for sharing NAS status information among the major airline operations centers and the Air Traffic Control System Command Center, thereby promoting access to basic information about system resources. CDMnet data is updated in five-minute intervals and is displayed on Flight Schedule Monitor (FSM) software.

The **FSM software version 1.8** was released in April 2000. FSM provides customers and air traffic managers with the same arrival information, monitors ground delays, measures ground delay performance, and gives traffic managers a "what-if" analysis capability for projecting scenarios and arrival rates. The new version of FSM provides aircraft operators with airport departure lists and ground stop lists and gives them the ability to calculate the delay an aircraft has taken during a ground stop. Currently FSM capabilities have been provided to traffic management units in all ARTCC's. Using FSM, airlines can see where systems delays are located and make scheduling decisions (i.e., cancel flights) that optimize their operations.

Improving communication, information sharing, and the exchange of real-time information are integral elements of the **Spring/Summer 2000** initiative announced in March 2000. By providing advanced planning information to NAS users and Air Traffic facilities and establishing the forum for real-time communication, Air Traffic intends to reduce the impact of severe weather on system operations and maximize the efficient use of the NAS. The **Collaborative Convective Forecast Product (CCFP)** is a critical tool for this planning effort that will enable the FAA and NAS users to use the same weather forecasts to determine how to deal with inclement weather.

The **Spring/Summer 2000 Strategic Plan of Operation (SPO)** was enacted on March 12, 2000. The **Strategic Planning Team (SPT)**, consisting of FAA and industry personnel and weather forecasters, collaborates via conference call on the formulation of the SPO every two to four hours, as conditions warrant. Once consensus has been reached on a comprehensive action plan, the SPO is posted on the ATCSCC web-site and issued as an advisory. A web-site for passengers (http://fly.faa.gov) has been developed as part of the program. Flyers can receive updates about flight delays at major U.S. airports and plan their travel accordingly.

In an effort to reduce route coordination time, **Coded Departure Routes (CDR)** and the **National Playbook** have been developed through the CDM process to give the ATCSCC, other FAA facilities, and system users a common product for various route scenarios. In addition, a **User Hotline** has been established to provide operational information to the NAS community in a timely manner. The hotline is activated during periods of rapidly changing conditions in the NAS. All are key components of Spring/Summer 2000.

As existing air-ground communications become increasingly more congested and messages are frequently misunderstood or require repeating, the need for datalink communications has become more pressing. The En Route **Controller Pilot Data Link Communications Build 1 (CPDLC 1)** and **CPDLC Build 1A** projects will supplant many of today's routine transmissions with digital data communication messages.

CPDLC Build 1 and 1A address the evolutionary development and implementation of the En Route CPDLC Ground System, the first step in implementing the en route service of the Aeronautical DataLink (ADL) System. The program will also establish the in service management support structures required to operate and maintain the ground systems as well as procure the Very High Frequency (VHF) Digital Link Mode 2 (VDL-2) communication service.

CPDLC services will minimize congested voice channels and provide for a more dynamic and efficient information exchange. Specifically, CPDLC 1 and 1A will provide properly equipped NAS users and controllers with capabilities for:

- Transfer of communications for aircraft leaving a sector,
- Initial contact and altitude verification for aircraft entering a sector,
- Altimeter setting message to provide the current altimeter setting for the location,
- Message text services for non-critical messages ("check for stuck mike," contact company")

Oceanic Data Link (ODL) enables direct two-way pilot-controller electronic communication for aircraft equipped with data link. In conjunction with the Future Air Navigation System (FANS)-1, ODL provides a means to automatically check pending clearances for conflicts while allowing the flight crews to automatically load flight clearances they have received into the aircraft's Flight Management System. ODL has been operational in all Anchorage Center sectors since April 1996, and in all sectors of the Oakland Oceanic Center since March 1999. In the New York Center ODL has been operating under Initial Operating Capability (IOC) since March 2000.

Full operations are planned at all Caribbean sectors in late 2000. Once full operations in the Caribbean are in effect, operation of the system will transition to New York's North Atlantic sectors.

DataLink Delivery of Expected Taxi Clearance (DDTC) transfers routine, recurring, and repetitive voice communications to datalink. It provides decision support for ramp operations and tower personnel, shares aircraft and gate status information between airlines and the airport traffic control tower, and provides pushback clearances from the airline ramp tower to the aircraft. DDTC consolidates gate and aircraft status information by using colors, symbols, lists, and animation to alert ramp and tower controllers of upcoming events and impending status changes. Air Traffic continues to support a practical demonstration and evaluation of DDTC at Detroit Metropolitan Airport (DTW), with sponsorship from Northwest Airlines and the support of ARINC. While evaluating the costs and benefits of DDTC at DTW, Air Traffic is looking to determine whether the benefits derived from DDTC are economically and technically feasible, or if they are particular to the DTW operating environment.

The **Weather and Radar Processor (WARP) Stage Zero** replaced the Meteorologist Weather Processor. WARP processes weather data and provides enhanced weather information to Center Weather Service Unit (CWSU) meteorologists and air traffic management personnel at the ATCSCC and at each ARTCC. WARP Stage-0 installations were completed in October 1997. The next stage, WARP Stage-1, will enable it to interface with additional NAS subsystems, including the National Airspace Data Interchange Network (NADIN), the Automated Weather Observing System (AWOS), Automated Data Acquisition System, the Weather Message Switching Center Replacement, and the Display System Replacement (DSR). The interface with DSR will enable display of detailed weather information on en route controller displays. Interoperability testing with DSR was completed in 1998. WARP Stage-1 testing will begin at Fort Worth ARTCC in late 2000.

The **Special Use Airspace Management System (SAMS)** is one component of the FAA's comprehensive Special Operations and Procedures mission and a key component of the Free Flight initiative. SAMS is the FAA's subsystem that provides integrated SUA schedule operations within the FAA, and between the FAA and the Department of Defense (DoD).

DoD entities will use the **Military Airspace Management System (MAMS)** to prepare and transmit their proposed schedules to the FAA. The FAA will redistribute this information via SAMS to the concerned facilities for SUA processing.

The **SAMS-MAMS (FAA-DoD) Interface Agreement** was concluded in March 1998 with data flow testing ongoing through the summer of 2000. The SAMS-MAMS interface is designated as the single conduit for exchange of SUA related schedules, data, and information. Currently schedules are the basis for SUA activation (i.e. the airspace goes "hot" or is activated at a predetermined scheduled time whether or not the mission has commenced.) If provided with real-time activation information, SAMS is capable of disseminating that information on a real-time basis.

The **Central Altitude Reservation Function (CARF)** is another FAA component supporting military operations. SAMS handles schedule information regarding “fixed” or “charted” SUA while CARF handles *ad hoc* time**/altitude reservations (ALTRV)**. Both subsystems deal with planning and tracking the military’s use of the NAS.

The **Surface Movement Advisor (SMA)**, a FFP1 core capability, is an airport automation system that facilitates information sharing among Air Traffic, airlines, and airport operations. SMA aids decision-making regarding the surface movement of aircraft. Under FFP1, the SMA tool has been deployed at all core capabilities locations: Detroit Metropolitan, Philadelphia International, Newark, Dallas/Ft. Forth, Chicago O’Hare and Teterboro airports. Documented benefits from SMA include savings in taxi time, reduced communications, faster aircraft turnarounds, fewer unnecessary diversions, and more efficient crew management.

In the Automated Flight Service Stations (AFSS), the **Operational and Supportability Implementation System (OASIS)** is being developed to replace aging Flight Service Automation System hardware. OASIS will enhance the safety and efficiency of the NAS by providing a modern graphical user interface for providing improved weather products including an integrated display of weather and flight route information. OASIS will be provided to FAA as a leased service and will be operated by flight service specialists around the clock. WARP provides weather input to OASIS, which then produces weather information products for flight service specialists and end users. OASIS can also provide a remote, portable workstation capability to enable support of airshows and other events where flight service specialists need to provide on-site services to users. OASIS completed integration test and evaluation at the FAA Technical Center in 1998, and Operational Tests and Evaluation (OT&E) was completed in November 1999. Initial limited deployment of OASIS to the Seattle AFSS is scheduled to take place in September 2000.

The **Integrated Terminal Weather System (ITWS)** will provide enhanced terminal weather data at 48 control towers, 38 TRACONS, and 19 ARTCCs. It will be the primary weather processor and data server for providing integrated terminal weather information to systems used by air traffic controllers and end users, thereby promoting common situational awareness. End users will include pilots using Automated Surface Observing System (ASOS) dial-in capabilities and local airline operations centers. ITWS integrates data from FAA and National Weather Service (NWS) sensors and systems and in-flight aircraft. It automatically provides weather information that is immediately useable without further meteorological interpretation. ITWS can be used to predict short-term hazardous weather changes to aid in sustaining capacity in severe weather conditions.

During 1998, ITWS completed preliminary design review and critical design review. The production ITWS system is currently in Formal Qualification Testing (FQT) with Factory Acceptance Testing (FAT) scheduled for August 2000. Installation and testing of the first article sites (Kansas City and Houston) begins in November 2000. OT&E of ITWS is scheduled to occur in April 2001. Prototypes are operating and providing benefits at the Orlando, Memphis, Dallas/Fort Worth and New York TRACONs. The Operational Readiness Demonstration (ORD) is scheduled for March 2002.

The **Airport Approach Zone Camera System** installed at the San Carlos, CA, Airport Traffic Control Tower is helping to better report current weather conditions for aircraft landing at San Francisco International Airport, approximately ten miles away. Air traffic controllers and weather forecasters are using these cameras to track real-time onset and dissipation of fog and low clouds in the airport's approach zone. Knowing the precise timing of increased visibility improves the airport's ability to operate at or close to full capacity.

Future Direction (2000-2004)

Air Traffic will continue to support the implementation of **CDM** through operational testing and evaluation of the Build 1 components. Air Traffic will also play a critical role in defining the information components of the NAS Status Information initiative.

The enhanced information sharing and collaborative planning elements of **Spring/Summer 2000** will allow NAS operators and their customers to be better informed thus managing their flights safely, efficiently, and effectively. This unique information exchange process will be continually evaluated and adapted as experience is gained in managing the system.

CPDLC 1 is proceeding with Very **High Frequency Digital Link Mode 2 (VDL-2)** at the key site, Miami Center. Miami Center has two people dedicated to developing training for controllers and developing operational procedures. The FAA Training Center in Oklahoma City is providing assistance in developing a training program that will be used to train controllers throughout the FAA. Likewise, the FAA Technical Center in Atlantic City is supporting Miami Center's effort to develop CPDLC operational procedures. Operational testing and evaluation in Miami is scheduled for mid-2000, and integration with the Host computer system will begin early in 2001. Initial operating capability is scheduled for mid-2002. American Airlines will complete VDL-2 equipage in early 2001. In late 2001, VDL-2 should achieve certification, operational approval, and IOC.

CPDLC Build 1A (CPDLC 1A) will increase the message set to 114 aeronautical telecommunications network (ATN)-compliant messages, accommodating assignment of speeds, headings, and altitudes, as well as provide a route clearance function. CPDLC 1A software development will proceed during the 2000-2001 period, with operational testing and evaluation beginning in late 2001. Host integration will follow in 2002, with integrated operational testing and evaluation occurring during 2003.

Airport Zone Cameras are scheduled to be installed and tested in additional facilities (i.e., Seattle Airport) to transmit current weather, as viewed from the Tower Cab, to NAS users.

Enhanced weather distribution systems will be developed and deployed during the next five years. **ITWS** operational test and evaluation is scheduled for completion in April 2001 with its first operational readiness demonstration scheduled for April 2002. **WARP** capabilities will be expanded during the 2000-2002 time frame with software upgrades and increased connectivity to a wide array of NAS end users. WARP will evolve in stages to become the primary weather processor and data server for integrated en route weather information. It will process inputs from National Weather Service models and from sensors such as the **Next Generation Radar (NEXRAD)** and **Terminal Doppler Weather Radar (TDWR)**. Then it will provide duplicate weather products to a variety of FAA and user systems, thereby promoting common situational awareness.

There are several initiatives planned for improving the distribution of accurate and timely SUA information. One focus of RTCA SC 192 Working Group-2's recommendations on SUA will be to identify methods for improving the quality and timeliness of information about the availability of SUA to other airspace users. In field trials conducted near Palatka, Florida the working group is demonstrating how improved communication can make more efficient use of SUA.

The SUA/In-Flight Service Enhancement (ISE) program is a Windows-based program developed at the Fort Worth Flight Service Station that is capable of providing flight service specialists with a visual display of SUA status and updated NEXRAD weather data. If an aircraft seeking assistance is on an active flight plan, the system interprets the aircraft's position from the Enhanced Traffic Management System (ETMS) data and gives the specialist a visual display of the aircraft's position relative to the weather and the SUA. This prototype system is undergoing field trials in the Forth Worth area as part of the RTCA SC 192 Working Group-2 research into more effective ways of communicating the current status of SUA.

A new version of **SAMS** (v.4.0) is being developed that is more autonomous and easier to interpret. This new version is expected to be prototyped, tested, and fielded during 2000. The SAMS project has absorbed and incorporated the CARF computer system onto SAMS hardware and network, creating the potential to merge SAMS (static SUA) and CARF /ALTRV into one integrated military system.

In the Western Pacific Region a major initiative to make operational data more readily available for timely analysis of NAS performance continues. Western Pacific Region was selected as the test region for the FAA and National Aeronautics and Space Administration (NASA) to establish Host Computer System and Automated Radar Terminal System (ARTS) data feeds at multiple facilities to provide input for a set of data archiving and analysis tools and capabilities. The initiative could support a variety of future performance analysis, airspace modeling, and noise modeling activities.

SEPARATION ASSURANCE

Customer Desired Services

Customers want air traffic service providers to rapidly identify traffic conflicts, propose solutions, and communicate recommended actions to pilots. Emphasis on separation assurance is a necessity as the current system evolves to support a free flight system. Customers also emphasize the necessity of separating aircraft on the ground with as much discipline as separating aircraft in the air.

Customers express their concern about human-factors issues. They want assurances that the changing human role receives ample attention in the provision for separation assurance.

Assessment of the Current System

In today's operational system, controllers normally provide resolutions to conflicts well in advance of their occurrence. On occasions where spatial and/or temporal circumstances demand immediate resolution, tactical, near-term advisories alert the controller to potential conflicts. The controller then provides resolutions to ensure safety is maintained within the affected airspace. Detection of aircraft-to-aircraft conflicts in the current system is primarily ground-based. Aircraft equipped with a **Traffic Alert and Collision Avoidance System (TCAS)** provide enhanced situational awareness and a backup to the ground-based system for separation assurance.

Air Traffic continues to support several efforts to examine issues associated with separation assurance and conflict detection. These efforts include programs to reduce runway incursions, to provide improved situational awareness during air and ground operations, to develop prototype decision support tools, and to improve the reliability of the air traffic control system. The following initiatives support these goals.

Increasing runway safety by reducing incidents and incursions is one of the Administrator's top priorities. Air Traffic Services has taken the lead in a number of new technological, procedural and educational/training initiatives to enhance runway safety. During the spring of 2000, nine regional workshops on runway safety were held, with representatives from airlines, airport officials, general aviation organizations, pilots and air traffic controllers meeting to identify additional ways to reduce runway incursions in the regions. A follow-up national summit will take place in June 2000 to share the results from the regional sessions and to review current efforts.

As part of the increased effort to support separation assurance and conflict resolution by reducing runway incursions, the **National Runway Safety Program (NRSP)** has been developed. The program establishes requirements and provides guidance for **Runway Incursion Action Teams (RIAT), Surface Incident Prevention Teams (SIPT)**, and **Regional Runway Safety Representatives (RRSR)**.

RIAT airport visits have proven to be a very effective tool in reducing runway incursions. The teams consist of representatives of Air Traffic, Flight Standards, Airports, Airport Operations and Maintenance, customers, and other interested parties. They conduct on-site evaluations at airports experiencing an unusually high incidence of runway incursions or surface incidents. At the conclusion of the RIAT visit, the team develops an action plan that lists agreed upon actions to prevent further incidents at that airport. The action items are then worked on by the Surface Incident Prevention Team (SIPT) until resolution is achieved. In addition, a list of RIAT airport action items is forwarded to the Runway Safety Program office (ATP-20). ATP-20 has compiled a listing of the most common actions evolving from past RIAT's for dissemination to Air Traffic Control Tower Managers to review with their SIPT's, in order to identify any actions that may work at their airport.

The **Airport Movement Area Safety System (AMASS)** is another program intended to provide separation assurance for aircraft on the ground and is an enhancement to the Airport Surface Detection Equipment Model 3 (ASDE-3) radar. AMASS provides air traffic controllers with early notification of potential surface conflicts.

The AMASS program underwent an in-depth review and restructure during the late summer and early fall of 1999. The FAA, NATCA, and outside experts formed a working group to redefine the purpose and use of AMASS information. They agreed that AMASS is to be used as a "collision prevention tool" and not necessarily a tool for maintaining a specific "separation assurance." This decision relieved the concern controllers had about potential liabilities and will now enable AMASS to be used as intended. This working group also addressed other human interface issues that have arisen with the management and operation of AMASS. Consequently, a revised acquisition strategy was developed in September 1999.

A total of 38 AMASS systems will be implemented at the nation's 34 busiest airports, with two support systems in Oklahoma City. With active NATCA participation, the program is currently on or ahead of schedule for all critical milestones in the program replan approved in September 1999. Twenty-three systems have been delivered and twenty accepted as of March 2000. Human factor issues critical to the commissioning process have been corrected. Operational test and evaluation (OT&E) of critical issues have been resolved and factory tested; OT&E field regression to validate the corrections is on schedule for June 2000. Initial operating capability (IOC) is on schedule for August 2000, with the IOT&E to follow in September at San Francisco and Detroit.

Air Traffic is collaborating with other FAA departments, other service providers, and NAS customers to develop improved methods for monitoring and separating aircraft both on the ground and in the air. Satellite based systems that report aircraft position data are one form of improved aircraft tracking. The Safe Flight 21 program is testing **Automatic Dependent Surveillance-Broadcast Mode (ADS-B)** and **Traffic Information Services-Broadcast (TIS-B)** technologies. ADS-B technology will provide the means for air and ground vehicles to broadcast and receive ADS-B messages via datalink containing information such as aircraft or vehicle identification, position, altitude, velocity and direction. ADS-B information will be displayed in the aircraft on a multifunctional display such as a **Cockpit Display of Traffic Information (CDTI)**. The intent of this information is to increase pilots' situational awareness, and to provide the controller with a more consolidated picture of controlled airspace.

TIS-B can be used as the enabling technology for allowing traffic and other data available on the ground to be provided to the cockpit. The first Operational Evaluation (OpEval) was conducted in July 1999 at Wilmington, OH, with additional testing to take place at Memphis and Louisville in FY 00 and 01. The Alaska Capstone Program began installation of ADS-B avionics and ground broadcast transceivers in FY 00 and will begin to use ADS-B to provide radar-like service for Bethel, AK in January, 2001. TIS-B will be included in December, 2000.

User Request Evaluation Tool (URET) is a conflict probe tool for airborne operations. Included among the FFP1 core capabilities, URET is a decision support aid that enables controllers to detect potential traffic conflicts up to twenty minutes ahead and potential airspace conflicts up to forty minutes in advance. Both Indianapolis and Memphis ARTCCs have placed URET into use in all sectors for evaluation. Demonstrated capabilities include: aircraft to aircraft conflict detection, aircraft-to-airspace conflict detection, and trial planning of proposed solutions to ensure they are conflict free. URET also reduces the controllers' need for paper flight strips. Benefits to customers have been a relaxation in boundary crossing restrictions allowing aircraft to stay higher longer, and more efficient routings saving time and fuel.

Air Traffic is nearing the end of a multi-year project to upgrade en route and terminal controller workstations in order to improve the reliability and function of systems whose purpose is to assure safe aircraft separation. The legacy en route workstations have been upgraded with the transition to DSR. Modern controller workstations and network infrastructure support the safety and efficiency of the NAS. DSR provides an automation platform upon which new functional and technical enhancements (including some FFP1 core capabilities) will be added in the future. As of May 31, 2000, all twenty DSR sites are fully operational.

The **Standard Terminal Automation Replacement System (STARS)** provides automation to support control of air traffic within the FAA Terminal Radar Approach Control (TRACON) and DoD Terminal Control regions. STARS will replace all terminal automation systems presently deployed at these facilities, including the Automated Radar Terminal System (ARTS) versions IIA / IIIA / IIIE, Micro-EARTS, and the DoD Radar ATC Facility-Direct Altitude and Identification Readout (RATCF-DAIR), PIDP systems and TPX-42-all of which are reaching the end of their service life.

For NAS customers, STARS will have immediate benefits by virtue of fewer delays due to system failures. Additional benefits will occur because STARS will provide the platform for future system enhancements that have direct customer benefits—especially in the area of enhanced separation assurance.

STARS was initially planned to be deployed in December 1998. Due to delays in the delivery of STARS, the FAA announced in April 1999 a revised milestone plan within the STARS program.

Under the revised plan, the STARS Early Display Configuration (EDC) began initial operations at the key sites of El Paso, Texas, and Syracuse, New York in December 1999 and January 2000 respectively. EDC incorporates resolutions to Computer-Human Interface (CHI) issues that were identified by controllers and maintenance technicians in the early phases of STARS development. Eleven additional FAA sites have been identified to receive EDC beginning in FY 2001. While EDC is being deployed, development of STARS Full Service Level (FSL) will continue. Installation of the first STARS FSL (FS-1) is planned for January 2002 at El Paso, Texas.

STARS FSL without Computer-Human Interface changes has been installed at Eglin Air Force Base in Valpraiso, Florida for the DoD. Operational testing of this system is scheduled to begin in the summer of 2000. Installation of STARS has begun at an additional DoD site, McGuire Air Force Base, in New Jersey. Once STARS FSL with all CHI changes has been tested and installed at key FAA sites, DoD sites that have STARS will be retrofitted with new hardware and software incorporating all CHI changes. This will result in one baseline for STARS.

Separation assurance for helicopters and other aircraft operating at low altitudes in the Gulf of Mexico Airspace has been examined through the collaborative efforts of the Southwest Region, the Houston Center, the Helicopter Safety Advisory Conference, and Flight Standards. In October 1998, the new *IFR Gulf of Mexico Vertical Flight Reference Chart* was published and the **"Grid System"** was implemented. Under this system, aircraft operating at or below 7,000 feet identify their route of flight by way of a series of grid squares shown on this chart. By establishing a concentrated series of common GPS "fixes" out over the open waters of the Gulf, controllers and pilots have a highly accurate way of tracking aircraft position data. This in turn allows for much greater efficiency in the use of the airspace, which translates to an operational benefit to the customers.

A PC-based system that will allow controllers to receive aircraft position reports via datalink is currently being studied. Customer feedback concerning the Grid System and its enhancements continues to be positive. Operational efficiencies during the IFR weather season continue to provide positive results. Southwest Region and the Gulf of Mexico Work Group (GOMWG) have developed several initiatives that they believe will enhance operational efficiency in the Gulf of Mexico Airspace. The use of the grid for higher altitudes, the revision of Letters of Agreement between Southwest Region and Mexico, continuance of two way interface efforts with the U.S. and Mexican computer systems (HOST and JADE), and the implementation of **Reduced Vertical Separation Minima (RVSM)** to alleviate developing capacity problems over the Gulf are among working initiatives.

A renewed effort is underway in Air Traffic facilities nationwide to address issues with operational errors (OE). Many facilities have implemented revamped quarterly workshops to examine casual factors, trends, and solutions and to share their findings. Nationwide Quality Assurance Reviews (QAR) are in progress. The top five facilities with the highest number of OEs are visited to review past OEs and to examine QA procedures in place at the facility. Facilities visited are required to develop an action / prevention plan, which is monitored by the Regional Office.

Southwest Region and Western Pacific Region are developing expertise in working with remotely operated aircraft (ROA) and unmanned aerial vehicles (UAV).

Formerly used only by military authorities, unmanned vehicles are now being developed to replace manned aircraft for surveying pipelines, power lines, and vehicular traffic. Advanced military versions are capable of flight in Class A airspace. The Association for Unmanned Vehicle Systems International (AUVSI) is working with the FAA to develop certification standards for commercial ROA's. Air Traffic ensures separation between all aircraft (both manned and unmanned) using the same separation minima. Operators of unmanned aircraft must be in radio communications with the responsible ATC facility, must be able to detect and avoid other aircraft, and must otherwise comply with current Federal Aviation Regulations (FAR).

Future Direction (2000-2004)

During the next five years through 2004, Air Traffic will continue to develop, refine, and deploy procedures and systems for safe and efficient separation assurance. The focus of these initiatives will be directed at conflict detection and avoidance in both ground and air operations, and at improving the reliability of Air Traffic's infrastructure. The following paragraphs describe a variety of activities being pursued, continued, or supported by Air Traffic to enhance separation assurance services. Human-factors considerations will be an integral component of each initiative.

The **National Runway Safety Program (NRSP)** continues to be successful in identifying areas that should be corrected to reduce runway incursions or surface incidents. This is a result of RIAT airport visits and their efforts. RIAT airports visits will continue and will include active participation from Regional and Facility Runway Safety Representatives, and airport Surface Incident Prevention Teams (SIPT). The Runway Safety Program Office is continuing its efforts to provide pro-active guidance to Air Traffic Control Tower Managers, their SIPT's, and NAS operators.

The FAA is scheduled to deliver forty **AMASS** systems by mid-2002. Acceptance date of twenty of the forty sites will be by mid 2000. Factory testing will be complete and operational test and evaluation (OT&E) field-testing will begin by mid-2000. AMASS adds an automation enhancement to the ASDE-3 radar to provide tower controllers with automatically generated visual and aural alert to aid in the prevention of accidents from runway incursions.

In conjunction with the CAA, the FAA will continue operational evaluations of **ADS-B/CDTI** in the Ohio River Valley and in the Alaskan Capstone region in 2000 and 2001.

FFP1 deployment of URET is on schedule with full-scale deployment decisions anticipated to be made by the end of 2002. In addition to Indianapolis (ZID), and Memphis (ZME) which are already using and evaluating URET, five other ARTCCs, [Chicago (ZAU), Atlanta (ZTL), Washington (ZDC), Cleveland (ZOB), and Kansas City (ZKC)], are part of the initial FFP1 URET deployment.

Under the revised plan, the STARS Early Display Configuration (EDC) began initial operation at El Paso, Texas and Syracuse, New York. EDC incorporates resolutions to Computer - Human Interface issues that were identified in the early phase of STARS development. Eleven additional sites will receive STARS EDC beginning in FY 2001. While EDC is being deployed, the development of STARS Full Service Level (FSL) will continue and then be incrementally installed in El Paso and Syracuse. In order to respond to critical interim requirements for new displays, the FAA will buy off-the-shelf color displays that are fully compatible with the current ARTS computer systems in facilities. These displays will be installed in the New York, Dallas-Fort Worth and Reagan Washington National TRACON's beginning in the summer of 2000.

DSR installations and enhancements at each of the en route centers have proceeded on schedule. The last installation was completed at the Air Route Traffic Control Center in Leesburg, Virginia on May 31, 2000, making all twenty sites operational. Ft. Worth Center will be the first to add WARP to DSR.

The implementation of the **"Grid System"** in the Gulf of Mexico has resulted in positive benefits for the customer. Southwest Region and associated facilities are working with the GOMWG and have established an action plan to provide improved efficiency in the Gulf of Mexico Airspace and ultimately provide the ability to apply Domestic Separation Standards in the airspace.

The **ROA** market is expected to nearly double ($2.1 billion in 1998) by 2003 and grow rapidly from that point. Forty percent of the world market is in the United States. Air Traffic is working with industry and Flight Standards to ensure that certification standards for unmanned vehicles provide for separation assurance.

USER OPERATIONAL EFFICIENCY

Customer Desired Services

NAS customers desire more flexibility in selecting and flying optimal routes at their desired times, speeds, tracks and trajectories. This flexibility allows them to implement fuel and time saving techniques in day-to-day operations. They also want delays to be allocated equitably among all operators with fewer ground and en route delays imposed by the system. They want the effects of weather and other factors to cause less variability in their operations, allowing them to maintain schedules and plans.

Assessment of the Current System

We have begun many initiatives to enhance customer operational efficiency. FFP1 Core Capabilities are on or ahead of schedule. Area Navigation Equipment (RNAV)/GPS routings to promote an efficient traffic flow for both enroute and terminals areas are continuing to be developed and are being included in several airspace redesign projects under the oversight of Air Traffic Office of Airspace Program Management (ATA). Many airspace improvements to promote the efficient flow of traffic in and out of major terminal areas are underway across the country. The Eastern Region (AEA) is looking at the complex flows affecting four New York airports (JFK, LGA, EWR, and TEB) and Philadelphia (PHL) airport.

AEA is designing new routes that will permit these airports to meet the increased demand for service while minimizing the environmental impacts. New technologies (RNAV, FMS, and GPS) that are becoming more common among users are the basis upon which this planning is occurring. The New York/New Jersey/Philadelphia redesign teams will design terminal and center airspace that will efficiently utilize point-to-point three-dimensional navigation systems, allowing for precise navigational routes without the need to over-fly land based navigational aids.

Using newly developed tools that speed the development of RNAV routes, the New York redesign teams are working with the lead air carriers at each airport, service providers, avionics manufacturers, and FAA representatives from Flight Standards, to design, test, and implement RNAV approach procedures at the New York airports. This follows an initial successful test of the expedited RNAV procedure development process at Philadelphia. Currently, work is underway developing procedures at Newark (EWR) and John F. Kennedy (JFK) airports with plans for new RNAV procedure development at LaGuardia (LGA) and Teterboro (TEB) later this year.

Eastern Region is also involved in the airspace redesign for the new Potomac TRACON by consolidating approach control facilities currently at Baltimore, Washington, and Andrews Air Force Base.

Outside of the New York area new RNAV procedures are currently under development in several other regions, including Charlotte (CLT), Detroit (DTW), Boston (BOS), Houston (IAH), and San Francisco (SFO) airports.

Several airspace redesigns projects are underway in the Great Lakes Region. Terminal area redesigns are occurring at Detroit and Minneapolis in anticipation of new runways. Indianapolis is working on improvements to flows around Cincinnati. Cleveland ARTCC is working redesign of enroute sectors that are frequently saturated.

The Southern Region (ASO) recently received an analysis of the effects of proposed triple **Simultaneous Offset Instrument Approaches (SOIA)** to the William B. Hartsfield Atlanta International Airport. ASO is also redesigning the terminal and enroute airspace in central Florida as part of the Sun Coast TRACON project, which will consolidate four approach control facilities — Tampa, Orlando, Daytona, and Jacksonville — into one consolidated facility.

Air Traffic recognizes the continuing need to make the system more efficient and has continued efforts to reduce static restrictions system-wide. In this regard, as part of **Spring/Summer 2000**, all Air Traffic facilities are required to receive ATCSCC approval for static restrictions of any kind. This requirement includes the tracking and validation of all issued restrictions by ATCSCC. Facilities that issue restrictions without ATCSCC approval will be held accountable for the action. These safeguards will help prevent the activation of unneeded dynamic restrictions that have the potential of rippling across several en route centers, causing unnecessary customer delays in the air and on the ground. Spring/Summer 2000 initiatives for strategic planning began March 12, 2000. ATCSCC established a planning area of operation and staffing for seven days per week from 0500 Eastern Standard Time (EST) through 2200 EST. The Strategic Planning Team (SPT), which includes FAA and NAS customers, will develop plans to address forecasted conditions two to six hours in the future.

The success of the planning endeavor is predicated on enhanced data and information sharing. The ATCSCC web site is being expanded to include a Strategic Planning page with links to pertinent information contained on other pages complete plan information will be available on the ATCSCC web. Some of the technologies available for strategic planning are **Flight Schedule Monitor (FSM), Collaborative Convective Forecast Product (CCFP),** and **Departure Spacing Program (DSP)**.

The **North American Route Program (NRP)** enables participants to select the most beneficial routes to fly based on their preferences. Customer participation in NRP continues to increase, averaging 1950 flights a day in April 2000, varying according to the jet stream. Responding to the customer's request for additional NRP program changes, a work group is making progress in reducing the 200 NM radius exclusion zones around origin and destination airports. They are doing this by developing departure procedures (DP) and standard terminal arrival route (STAR) transitions as ingress and egress points to the NRP. As of January 2000, 67 DP's and 97 STAR's have been implemented to replace the 200 NM exclusion zone at those locations.

Air Traffic's **Published Preferred Route Reduction (P2R2)** work group, formed in 1997, has successfully eliminated 139 Preferred IFR Routes. ATC Preferred Routes will continue to be considered for elimination until the published preferred route system meets the safety and efficiency needs of the National Airspace System.

Cooperative efforts between Air Traffic Regions and their customers are creating new operational efficiencies for NAS customers. Air Traffic has supported the implementation of a software enhancement in the en route automation system to allow the filing of **RNAV/GPS routes** that will increase user flexibility. Each region is forming teams to assist customers who want to develop RNAV/GPS routes.

The New England Region has developed 70 intra-region RNAV/GPS applications known as "GPS preferential routings." The Boston (ZBW), New York (ZNY) and Washington (ZDC) Centers have completed 120 RNAV/GPS routes and GPS approaches for use by GPS-equipped aircraft, and are continuing to publish GPS routes at a rate of 500 per year.

Several field initiatives support customer efficiency and dynamic routing. At the George Bush Intercontinental Airport (IAH) in Houston, an RNAV/FMS approach with vertical path was jointly developed with Continental Airlines for the Runway 8 Instrument Landing System (ILS) planned outage. This procedure worked so well for Continental that United Airlines has requested permission to fly the approach. In addition, special RNAV overlay approaches have been coordinated with U.S. Airways for use at Tampa, Raleigh, and Charlotte airports.

The "No Speed Limit" procedure (the elimination of the 250 knot speed restriction below 10,000 feet for turbojet departures) being tested at Houston (IAH) has proven to be cost efficient. Customer concerns about aircraft potentially exceeding the lateral limits of Class "B" Airspace are being examined.

In the Western Pacific Region, Air Traffic's **"Dual Civet"** enhancements have resulted in increased airport capacity and substantial saving to the customer at Los Angeles International Airport (LAX). ATCSCC-issued ground delay programs of previous years have been virtually eliminated. Arrivals from the east are no longer delayed due to the use of a single fix. Runway capacity is now considered the primary limitation.

Air Traffic is currently developing an enhancement to the basic "Dual Civet" which will extend the LAX dual flow farther east. A similar effort to develop a dual arrival flow east is underway in the San Francisco Bay area.

Oceanic improvements include the further expansion of the **Reduced Vertical Separation Minima (RVSM)** from 2,000 to 1,000 feet for flight levels 310 through 390 in the North Atlantic. Phase One of **Western Atlantic Route System (WATRS) RVSM** plan will expand the FAA designated transition areas to U.S. facilities adjacent to the New York FIR with the exception of the San Juan Combined Center Radar Approach Control (CERAP). Transition airspace is planned to extend into adjacent radar-controlled portions of Miami, Jacksonville, and Washington ARTCCs in late 2000.

In February 2000, **Pacific RVSM** was approved and implemented in the Oakland Center (ZOA), Anchorage Center (ZAN), Tokyo, Nauru, Naha, Tahiti, Auckland, Honiara and Brisbane FIRs from Flight Level (FL) 290 to FL390. The RVSM Task Force met in April 2000 to discuss implementation of RVSM in the Western Pacific and South China Sea areas and to conduct a 60-day follow-up to the Pacific RVSM implementation. As a result of this meeting, the task force agreed to expand the application of RVSM up to and including FL 410 effective October 2000. The application of RVSM above FL 390 will be non-exclusionary.

Air Traffic is also making an effort to adopt the use of new decision support tools. The **Traffic Flow Management (TFM) Concept Exploration Platform** in Kansas City Center is being used for refinement of concepts and requirements to accelerate the delivery of new capabilities. A new reroute planning and analysis tool, the Collaborative Routing Coordination Tool (CRCT), is currently in the demonstration and evaluation at Kansas City ARTCC, and by September 2000 will be in place at Indianapolis ARTCC. This tool will increase efficiency of flow-related reroutes used in response to weather and congestion situations. Development and evaluation activities are continuing at the ATCSCC with a focus on national capabilities.

CTAS TMA and **pFAST** are being tested at Dallas-Fort Worth International Airport (DFW) and at the Fort Worth center (ZFW). Both tools are part of the FFP1 core capabilities, and have attained Initial Daily Use (IDU) status at both facilities. Additionally, pFAST has increased the arrival rate by two aircraft per rush period (approximately 30 minutes). The staging for Atlanta TRACON has been completed, and shadow testing of TMA has begun at Minneapolis Center (ZMP). The installation of pFAST at Southern California TRACON has been completed. TMA Initial Daily Use is anticipated at Minneapolis Center, Denver Center, and Atlanta Center between June and November 2000.

Precision Runway Monitor (PRM) enables airports with closely spaced parallel runways to reduce the separation between aircraft making simultaneous instrument approaches. In February 1999, PRM approaches at the Minneapolis/St. Paul Airport (MSP) were authorized for IFR Category 1 minima. The PRM Working Group formed by Air Traffic continues to address issues that have arisen such as pilot training, participating and non-participating aircraft, which are impeding the progress of PRM at MSP. The PRM working group is proceeding with their plan to install PRM at the Philadelphia, John F. Kennedy, and Atlanta airports, and is collaborating with the City of San Francisco on its proposal to install PRM at San Francisco International Airport.

Future Direction (2000-2004)

To increase customer flexibility, Air Traffic will continue to work with its customers to evolve services in the direction of the free flight concept as described by the RTCA Free Flight Action Plan and the Administrator's NAS Modernization Task Force. Free Flight Phase 1 (FFP1) components will continue to be deployed on or ahead of schedule, and Free Flight Phase 2 will be initiated to expand upon the success of FFP1.

The Houston area is about to begin a large terminal redesign process. The expedited RNAV development process prototype in Philadelphia and New York will take another step forward in Houston. The development tool, currently residing on a Linux operating system, will be modified for use in a Windows operation system. It will be turned over from the developers to FAA specialists in Houston who will use it to develop their new RNAV procedures.

Western Pacific Region (AWP) has a number of initiatives in the planning stages that will be developed in the near future. Among these are improved traffic flows between the Bay area and Los Angeles (Bay to Basin) via series of proposed RNAV routes. AWP is also looking at ways to improve flows constricted by the narrow corridor on the east side of the R-2508 area.

Currently Air Traffic has initiated an operating environment where customers can operate at greater optimum efficiencies in domestic and oceanic airspace. In the future there will be an increased ability to accommodate customer preferences for trajectories, scheduling, and flight sequencing with improved decision support tools for conflict detection, resolution, and flow management. These improved decision support tools will assist Air Traffic in granting user preferences on trajectories with minimum intervention and adjustment. Through both enhanced automation support and procedural changes, user preferred trajectories will be accommodated earlier in the flight and will continue closer to the destination than is currently allowed.

Air Traffic will continue to study the potential reduction of the number of preferred IFR routes, thus increasing customer routing flexibility. The **P2R2** work group will continue its evaluation of the routes initially identified for possible elimination.

As a result of the implementation of enabling technology and new procedures, **oceanic minimum horizontal separation standards**, both lateral and longitudinal, will be reduced. **Pacific RVSM**, implemented in February 2000 for Oakland and Anchorage Centers FIRs between flight levels 290 to 390 inclusive will be reviewed and expanded. Further RVSM implementation in the Western Pacific and South China Sea areas is currently being reviewed for development. Introduction of future air navigation systems (FANS) and automatic dependent surveillance service will enable further reductions of the oceanic horizontal separation minima in the Pacific to 50 NM longitudinal by 2001. Further separation reductions in the Pacific (e.g., 30/30) are being evaluated for the 2003-2005 time frame.

By 2001, standards should be reduced to 30 NM lateral and less than 10 minutes longitudinal in the North Atlantic. Phase One of **WATRS RVSM** plan will expand the FAA designated transition areas to U. S. facilities adjacent to New York FIR with the exception of San Juan CERAP.

Air Traffic will continue to evaluate procedural changes that will permit customers to more efficiently operate RNAV equipped aircraft in domestic airspace. Air Traffic supports the implementation of RNAV-based and satellite-based departure and arrival routes, as well as instrument approaches. Air Traffic also supports increased use of low-altitude direct routes using GPS navigation. United Airlines is working with Bay TRACON and San Francisco International Airport (SFO) on a proposal for **SOIA** at SFO. SOIA would use the **PRM** to reduce separation minima in terminal airspace and enable dual stream approaches on bad weather days. PRM and CTAS tools would be used to support this type of enhanced procedure. SFO estimates

SOIA could reduce delay by as much as 15 percent. The procedure is now in the requirements definition phase, and there are some issues, including wake turbulence, that must be resolved.

FFP1 plans call for expanding the use of **Traffic Management Advisor** to Minneapolis and Oakland ARTCCs in 2000 with enhanced versions of TMA. During 2000-2001, the ARTCCs that currently have TMA will receive system enhancements. pFAST has been installed at Southern California TRACON, and has completed staging at Atlanta TRACON. Plans also call for the use of pFAST to be expanded to St. Louis and Atlanta in 2001.

Land and Hold Short (LAHSO) procedures expedite the flow of traffic at airports by allowing aircraft landing on one runway to land and hold short of an intersecting runway where there is an arrival or departure operation. This permits two nearly simultaneous flows to occur. The LAHSO procedure has been used safely since 1968 to increase airport capacity at busy airports. In March 1999 the FAA issued a notice, effective in April 1999, prescribing standards for use by Air Traffic, Flight Standards, and airports in approving and conducting LAHSO operations. This notice will remain in effect until the new LAHSO order with new standards goes into effect on August 14, 2000.

The Air Traffic Control System Command Center and Eastern region headquarters have implemented a new traffic management tool in an effort to reduce delays during the severe weather season in the New York area. The **Departure Spacing Program** tool has been deployed and is operational at New York Center, New York TRACON, Kennedy ATCT, Newark ATCT, LaGuardia ATCT, and Philadelphia ATCT. DSP is a coordination and planning tool that uses pertinent air traffic information from airports equipped with the system, along with other information from filed flight plans, to coordinate departures by spacing aircraft more evenly. DSP will be instrumental in improving system performance when reroutes are required as a result of Severe Weather Avoidance Procedures (SWAP). Coded SWAP routes that are tactical in nature have been developed and will be used to support the strategic planning efforts. In the future, this system will be expanded to allow the Air Traffic Control System Command Center in Herndon, Virginia to facilitate the flow of traffic into and out of all of the northeast U.S. airports to maximize use of available space.

SYSTEM ACCESS

Customer Desired Services

The current air traffic control system provides customer services essentially on a first-come, first-served basis to all users. However, the system still has restrictions that can limit users' access. Customers want the NAS to be operated more efficiently, eliminating these restrictions whenever possible, granting them greater freedom to operate more economically. Our aviation customers desire unlimited and flexible access to all NAS resources. They want equitable access to airports, to airspace, and to collaborative information and decision-making systems, for all classes of aviation users. Providers of space launch and recovery services are increasing the frequency of their operations and will require temporary airspace restrictions while their vehicles transit to and from earth orbit. Likewise, Remotely Operated Aircraft and Unmanned Aerial Vehicles are becoming more prevalent and want access to the NAS. The needs of all users must be considered in planning the evolution of Air Traffic services.

Air Traffic will follow two primary strategies to satisfy its customers' needs. First, Air Traffic ensures efficient management of FAA resources, including rapid response to changing circumstances, both internal and external to the FAA. Second, Air Traffic provides equitable access, improved capacity, and high quality service to all NAS users.

Assessment of the Current System

As air traffic volume increases and customer operations evolve, there is an added requirement for airspace management to focus on a system perspective. The Air Traffic Airspace Management Program Office (ATA) has the primary goal to establish and sustain an airspace structure that improves access and capacity for the customer while maintaining safety and efficiency.

The FAA Administrator launched the **National Airspace Redesign** program in April 1998. Charged primarily with this key activity, ATA oversees the review, redesign, and restructure of the national airspace to efficiently and effectively meet the needs of diverse customers and dedicated service providers. The **Airspace Liaison Team (ALT)**, composed of FAA regional and headquarters stakeholders, was formed as the FAA entity to provide oversight of major airspace redesign and management activities.

In 1999 the ALT commissioned a work group to develop a strategic vision for accomplishing National Airspace Redesign. That group produced the *National Airspace Redesign Strategic Management Plan*, which establishes the process, structure, and responsibilities for developing, managing, and implementing the National Airspace Redesign. The *Strategic Management Plan* serves as single document to provide a definition of the program, list broad goals and objectives, and define mechanisms to be used to achieve those ends. Additionally, it outlines the relationships between the FAA National Airspace Redesign and other NAS modernization programs, and identifies methods for documenting, tracking, and evaluating the redesign process.

With the evolution of more sophisticated technology and a more collaborative decision-making environment, more sophisticated capabilities are available to support the redesign process. The tools available have varying detail and fidelity and require varying resources. These tools are being used to identify national and regional solutions.

Airspace redesign efforts occur on the regional as well as on the national level. Current regional efforts underway in New York, Atlanta, and Los Angeles are focusing on a “runway-up” (bottom-up) approach to airspace redesign. Regional efforts are also examining the en route airspace within the boundaries of the region. National airspace redesign efforts coordinate between regions and on efforts that affect flows outside of the regional boundaries. National redesign joins regional projects together by using a “sky-to-runway” (top-down) approach to redesign.

A smaller **subgroup of the ALT (SALT)**, consisting of both management and union representatives from all parts of the United States, has formed to provide a source of national expertise and knowledge capable of reviewing proposals that will affect the airspace beyond regional boundaries. The SALT is tasked by the ALT to review, prioritize, and make recommendations about National Airspace Redesign issues to the ALT, thereby facilitating the decision-making process and expediting National Airspace Redesign.

A national model simulation and analysis capability for airspace analysis, including both tactical and strategic analysis, has been developed. This laboratory provides tools for the National Airspace Redesign and select specialized support for regional airspace activities. The laboratory also supports evaluations of the airspace structure and the projected traffic flows to facilitate making adjustments to the structure in order to accommodate those flows.

Along with the Office of Commercial Space Transportation (AST), Air Traffic has developed a concept for evaluating the effect proposed spaceports would have on the NAS.

Although still in its infancy, the **commercial space launch industry** is expected to grow dramatically over the next decade, affecting the use of both U.S. and international airspace. Activities that in the past were conducted by military and civil agencies are increasingly being shifted to “for-profit” providers. The demand for low-cost space launch services is spurring an increase in launch sites and competition between launch vehicle manufactures, launch service providers, and governments interested in ensuring their nation has space launch capabilities. In the U.S. five sites-Cape Canaveral Air Force Station in Florida; Vandenberg AFB in California, the Alaskan Spaceport on Kodiak Island, the Virginia Spaceport on Wallops Island, and a floating platform which is moved for launches to a position approximately 1,000 miles southeast of Los Angeles-are licensed by the FAA for commercial space launches.

In CY 1999, U.S. launch service providers conducted 17 launches licensed by the FAA’s Office of the Associate Administrator for Commercial Space Transportation. Of the 17 FAA-licensed launches, 13 were conducted for commercial customers and two were conducted for U.S. Government agencies, all from U.S. launch ranges. 1999 revenues from FAA-licensed space launches were valued at approximately $851 million. U.S. launch service providers held a 36% share of the world market for commercial launches in CY 99.

Under current and past practice, Air Traffic restricts aviation traffic from airspace around a launch trajectory to ensure separation and to provide a safe area in the event the space mission is aborted in-flight. With the number of launches expected to increase, Air Traffic is concerned about the increasing frequency of imposing restrictions on other NAS users. In March 2000, AST hosted the Commercial Space Transportation Advisory Committee's (COMSTAC) Launch Operations and Support Working Group, which was established to address issues concerning space launch infrastructure, including operations and management at U.S. space launch bases and ranges and FAA-licensed commercial spaceports.

Air Traffic is addressing access needs beyond airspace. In the **Gulf of Mexico**, the Southwest Region has dealt with rapid traffic growth and gaps in VHF communications with aircraft flying at and above flight level 180. Driven in a large part by the North American Free Trade Agreement, traffic in the area has been increasing steadily. The anticipated easing of tensions between the U.S. and Cuba is expected to add to the increase in traffic. The communications coverage gaps in the Gulf of Mexico limit capacity and system access.

Southwest Region is addressing this situation by using transceivers located on three buoys to alleviate the communications gaps. With complete communications coverage, domestic procedures can be allowed in the offshore airspace. The region also completed a realignment of all routes in the Gulf, and it expects to move Houston ARTCC's airspace further to the east to provide better service to high altitude users. Work is also proceeding on a means to interface the FAA's computer system with Mexico's JADE system, to automate hand-offs to Mexico. This conforms to the objectives outlined in other multi-lateral plans to create a seamless global air traffic environment.

The **Year 2000 (Y2K)** repair process has been dubbed a major success. All systems turned over to "00" without a hitch, and air traffic continued without disruption. The FAA assessed and certified 628 systems and programs during the effort to ensure Y2K compliance.

Future Direction (2000-2004)

Air Traffic will continue to work with aviation users in the review and redesign of the national airspace. The airspace structure will be evaluated and modified as operationally appropriate to improve efficiencies as the NAS evolves towards free flight concepts. The **National Airspace Redesign** will not be based on a description of an end-state system, but, rather, will consist of incremental changes consistent with the operational concept for the evolving stages of the NAS. Environmental issues will continue to be addressed in parallel with design analyses, and Air Traffic will conduct community outreach proactively.

Over the next year, the National Airspace Redesign work groups will evaluate the possibility of defining a high altitude airspace structure where the FAA could begin to implement many of the Free Flight concepts. This airspace would allow equipped users to begin achieving the economic benefits of flying their preferred routes and altitudes with fewer restrictions than the present system requires. The **High Altitude Airspace Concept (HAAC)** defines how one segment of the NAS could provide more of the freedoms described in the Free Flight Concept while permitting transparent operations for aircraft entering from and leaving to adjacent airspace.

Development and enhancement of **dual arrival flows** into major western airports is underway, as are airspace redesign efforts. Research in conducting simultaneous **parallel instrument operations to three runways** has begun. pFAST has been installed at several locations and procedural development has begun.

The demand for low-cost **space launch** service is spurring demand for additional launch sites. Other possible sites for commercial launches in U.S. airspace include a location near White Sands, New Mexico, and Edwards AFB in California. The addition of space launch trajectories from inland launch sites will have a more significant effect on aviation traffic flows than the current coastal launch sites.

To reduce the cost of launches, space vehicle manufacturers are developing reusable launch vehicles that will require separation from other aircraft as they reenter the NAS. Current projections for U.S. commercial launches call for a maximum of approximately 60 per year through 2005. (These forecasts do not include launches of government payloads by government agencies like NASA.) If the manufacturers of reusable launch vehicles are accurate in their forecasts, there could be greater demand on airspace than currently forecasted. The degree to which each of the proposed reentry vehicles will be able to maneuver varies, so the effect of their reentry is difficult to measure until we know which designs will succeed.

Officials at the Northwest Mountain Region are preparing for the **Salt Lake City Olympic Games** in February of 2002 and the **Special Olympics** just two weeks later. An on site manager has been established to coordinate all Olympic-related air traffic issues in Salt Lake City. Planning is underway to accommodate the ingress and egress of aircraft flown by commercial carriers, businesses, private individuals, military and law enforcement agencies, and worldwide media organizations. Plans to meet this enormous challenge include building three temporary towers and adding an ASR-9 radar site at Provo, Utah. Mobile radar sites will further supplement surveillance capabilities. The region is also planning temporary communications upgrades and is cooperating with other agencies to heighten security for the games.

ACTION PLANS

The preceding sections describe the initiatives to which Air Traffic is committed for the purpose of improving customer service. This is not a static or comprehensive list of initiatives; rather, it serves to highlight those activities in which we believe customers have the most interest.

The purpose of this section is to summarize how the improvements described in the ***Air Traffic Service Plan*** stem from the concepts enumerated in the *Air Traffic Services (ATS) Performance Plan for Fiscal Years 2000-2002*, and other FAA strategic plans. The *ATS Performance Plan for Fiscal Years 2000-2002* outlines ATS' services, its performance outcomes and targets, and its strategies to meet those targets.

The *ATS Performance Plan for Fiscal Years 2000-2002* identified eight performance outcomes, six of which are relevant to this plan. We use these six outcomes as the new structure within which we describe the planned actions. These outcomes are:

- Increase System Safety
- Decrease System Delays
- Increase System Flexibility
- Increase System Predictability
- Increase User Access
- Improve Service Delivery by Increasing the Availability of Critical Systems

Increase System Safety

Maintaining the highest levels of safety in air travel and transport is the primary consideration in all operational decisions. The ATS performance targets are to decrease the rates of operational errors by maintaining a Monthly Operational Error rate of below 0.60 per 100,000 aircraft activities, and reduce runway incursions to a baseline of 234.

One of the major approaches to reducing operational errors and runway incursions is to provide a common level of understanding of procedures and policies among NAS operators and customers that will ensure safe operations. Training for controllers and cross-educational programs between pilots and controllers are essential to this, and will continue to be the focus of Air Traffic safety strategies. Enhancements and changes in the tools that support separation assurance services also contribute to the safety outcome. Technological improvements such as deployment of modern displays, decision support tools, and improved communications systems will support better determination of aircraft location and resolution of potential conflicts both in the air and on the airport surface. The specific actions that Air Traffic will achieve include:

- Continue operational error awareness, by conducting refresher training addressing causal factors and trends
- Maintain the requirements of the National Runway Safety Program, increase RIAT visits, and improve ATS ability to determine and disseminate trend and problem solution information
- Continue to provide training and awareness of runway incursions and surface incidents
- Continue AMASS deployment and evaluation

Decrease System Delays

Several improvements during the next few years will focus on the expansion of Free Flight Phase 1 tools, new runways, critical infrastructure replacement programs and improvements in aviation weather systems. Airspace and airport capacity will be enhanced to improve throughput and to allow aircraft to operate safely with minimal delay in congested areas. Refined implementation of Airway Facility's NAS Service Management System, and investments in the NAS Service Infrastructure Management System (NIMS) will increase operational availability of the NAS infrastructure, reducing equipment related delays. Continued customer involvement in traffic management decisions regarding ground delay programs will help reduce delays in flight schedules. While weather delays are more difficult to influence, ATS will continue to support collaborative decision making when implementing automated weather detection and forecasting tools to reduce the impact of these delays. Specific actions that Air Traffic will achieve include:

- Implementation of new procedures that take advantage of additional runway and airport capacity increases at various locations
- Expanded Free Flight Phase 1 deployment of pFAST and single-center TMA capabilities
- Evaluation and implementation of Standard Terminal Automation Replacement Systems (STARS)
- Development of technologies and procedures that will improve air traffic delay reporting
- Continued evaluation of the Integrated Terminal Weather System (ITWS) and the Weather and Radar Processing (WARP) Stage-1
- Identification and incorporation of actions that maximize airspace efficiency and airport capacity

Increase System Flexibility

The introduction of new procedures and new elements of traffic management are key to system flexibility. Improved flexibility allows for dynamic application of existing capabilities and permits real time advanced planning. For increased flexibility in the NAS, ATS has implemented a number of initiatives designed to continue the evolvement toward the free flight concept of operations. Three of the components of the North American National Route Program - Published Preferred Route Reduction Program (P2R2) , departure procedures (DP), standard terminal arrival route (STAR) program, and Restriction Performance Management (RPM) program — are air traffic management initiatives designed to offer flexible, cost-effective routing options. Each component program operates independently of the others but with interrelated activities and efforts. Specific milestones that Air Traffic will achieve include:

- Continued evaluation of preferred routes for possible elimination
- Reduction of horizontal separation minimums in the Pacific to 50 NM laterally for all Pacific airspace by early 2001
- Extension of RVSM to the remaining areas of the Atlantic and the Pacific
- Continued publication of DP's and STAR's as ingress and egress points to the NRP
- Continued collaboration with NAS customers on the NAR
- Enhancement of the RPM program
- Further evolution of MAMS and SAMS with DoD

Increase System Predictability

System predictability allows customers to plan and manage their resources more efficiently. Increasing information availability to NAS customers is an important ingredient to improved system predictability. The strategy of collaborative planning between ATS and all NAS customers is the foundation for future predictability needs. As weather is a main contributor to the uncertainty in the Air Traffic Management system, improvements in obtaining and disseminating weather products are important. These improvements will provide the capability to supply consistent information to both pilots and controllers so they can realize the same degree of situational awareness. The specific actions that the Air Traffic Service will achieve include:

- Fielding and evaluation of visual collaboration capability between ATCSCC and control facilities to support collaborative routing coordination with strategy evaluation capabilities
- Improvement of the Special Use Airspace Management System for dispersing information about SUA status and usage
- Continued collaborative decision making with ATCSCC, AOC's, GA and other customers

Increase User Access

Access to airports, airspace and air traffic services are basic needs of all NAS customers. Though there are many aspects of system accessibility that impact the end customers, ATS is focusing on increasing availability of vertical descent guidance for precision approaches during low visibility weather conditions. The FAA's navigation and landing systems are evolving from ground based installations to an airborne satellite system. The system consists of the Global Positioning System (GPS) augmented by the Wide Area Augmentation System (WAAS), and the Local Area Augmentation System (LAAS). GPS/WAAS and LAAS will provide precision approaches to selected airports.

In addition, ATS plans to improve the quality and quantity of information available for flight planning and execution by all NAS customers through modernization of aviation information services. The specific actions that Air Traffic will achieve include:

- Renewed effort on the implementation of WAAS
- Implementation of strategic plan to guide spectrum management functions
- Publication of a minimum of 500 new GPS approaches per year
- Provision of improved flight services, including initial implementation of OASIS
- Expansion of call rerouting from busy AFSS' to facilities with shorter waiting times

Improve Service Delivery by Increasing the Availability of Critical Systems

The NAS is an inherently complex system with multiple levels of redundancy to assure availability of key services. The bulk of the NAS equipment is used to provide separation assurance, aviation information, search and rescue, and traffic management services. The ATS performance targets are to maintain the operational availability of equipment at current levels while minimizing the effect of service disruptions, and to increase infrastructure service and equipment availability. Improving the aging infrastructure with new technology—such as deployment of modern displays, automation, decision support tools, and communication systems will support the availability outcome and using better methods for maintaining and operating the resultant systems will minimize service disruptions. Automation tools are available to measure key performance parameters of NAS equipment against established metrics. With the information provided by these emerging tools ATS can better understand the performance of the NAS and quickly identify specific causes for poor performance. Specific milestones that Air Traffic will achieve over the next five years include:

- Completion of DSR implementation in 2000
- Continued resolution of STARS human factors issues
- Expanded evaluation and deployment of STARS
- Enhanced centralized monitoring, event management, restoration coordination, and performance reporting through the National Operations Control Center (NOCC) and Operational Control Centers (OCC)
- Establishment of Service Operations Centers (SOC) in ARTCC's and large TRACON's

ACRONYMS

AAT	Director of Air Traffic
ADL	Aeronautical DataLink
ADS-B	Automatic Dependant Surveillance - Broadcast Mode
AFSS	Automated Flight Service Station
ALT	Airspace Liaison Team
ALTRV	altitude reservations
AMASS	Airport Movement Area Safety System
AOC	Airline Operation Control Center
ARINC	ARINC, Inc.
ARTCC	Air Route Traffic Control Center
ARTS	Automated Radar Terminal System
ASDE	Airport Surface Detection Equipment
ASOS	Automated Surface Observing System
AST	Associate Administrator for Commercial Space Transportation
ATA	AAT's Airspace Management Program Office
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
ATCT	Airport Traffic Control Tower
ATM	Air Traffic Management
ATN	Aeronautical Telecommunications Network
ATOP	Advanced Technologies and Oceanic Procedures
ATP	Air Traffic Planning and Procedures
ATS	Air Traffic Services
ATSP	Air Traffic Service Plan
AUVSI	Association for Unmanned Vehicles International
AWOS	Automated Weather Observing System
CAA	Cargo Airline Association
CARF	Central Altitude Reservation Function
CCFP	Collaborative Convective Forecast Product
CDM	Collaborative Decision Making
CDMnet	Collaborative Decision Making Network
CDR	Coded Departure Routes

CDTI	Cockpit Display of Traffic Information
CETF	Capacity Enhancement Task Force
CHI	Computer-Human Interface
CNS	Communication, Navigation, and Surveillance
CONOP	Concept of Operation
CPDLC I	Controller Pilot Data Link Communications Build I
CPDLC IA	Controller Pilot Data Link Communications Build IA
CRCT	Collaborative Routing Coordination Tool
CTAS	Center TRACON Automation System
CWSU	Center Weather Service Unit
DDTC	Data Link Delivery of Expected Taxi Clearance
DOD	Department of Defense
DP	Departure Procedures
DSP	Departure Spacing Program
DSR	Display System Replacement
EDC	Early Display Configuration
ETMS	Enhanced Traffic Management System
FAA	Federal Aviation Administration
FANS	Future Air Navigation Systems
FAR	Federal Aviation Regulation
FFP1	Free Flight Phase - 1
FFP2	Free Flight Phase - 2
FIS	Flight Information Service
FL	Flight Level
FMS	Flight Management System
FSL	Full Service Level
FSM	Flight Schedule Monitor
GA	General Aviation
GDP	Ground Delay Program
GOMWG	Gulf of Mexico Work Group
GPS	Global Positioning System
HAAC	High Altitude Airspace Concept
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
ITWS	Integrated Terminal Weather System

LAADR	Low Altitude Arrival Departure Routes
LAHSO	Land and Hold Short Operations
MAMS	Military Airspace Management System
MOA	Military Operations Area
NADIN	National Airspace Data Interchange Network
NAR	National Airspace Redesign
NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NATCA	National Air Traffic Controllers Association
NEXRAD	Next Generation Radar
NOTAM	Notice to Airmen
NRP	North American Route Program
NRSP	National Runway Safety Program
OASIS	Operational and Supportability Implementation System
ODL	Oceanic Data Link
OOOI	Out, Off, On, In
OWG	Oceanic Work Group
P2R2	Published Preferred Route Reduction
pFAST	passive Final Approach Spacing Tool
PIREP	Pilot Report
PRM	Precision Runway Monitor
RAPCON	Radar Approach Control
RIAT	Runway Incursion Action Team
RNAV	Area Navigation Equipment
ROA	Remotely Operated Vehicle
RRSR	Regional Runway Safety Representative
RTCA	RTCA, Inc., formerly Radio Technical Commission for Aeronautics
RVSM	Reduced Vertical Separation Minima
SALT	Sub-group of Airspace Liaison Team
SAMS	Special Use Airspace Management System
SC 192	RTCA Special Committee 192, NAS Redesign Planning and Analyses
SENEAM	Mexico’s Air Traffic Services Corporation
SIPT	Surface Incident Prevention Team
SMA	Surface Movement Advisor
SNUG	Satellite Navigation Users’ Group
SOIA	Simultaneous Offset Instrument Approaches

SPO	Strategic Plan of Operation
SPT	Strategic Planning Team
STAR	Standard Terminal Arrival Route
STARS	Standard Terminal Automation Replacement System
STMC	Supervisory Traffic Management Coordinator
SUA	Special Use Airspace
SUPCOM	Supervisor's Committee
SWAP	Severe Weather Avoidance Program / Procedure
TCAS	Traffic Alert and Collision Avoidance System
TDWR	Terminal Doppler Weather Radar
TFM	Traffic Flow Management
TIS	Traffic Information Service
TMA	Traffic Management Advisor
TMC	Traffic Management Coordinator
TMU	Traffic Management Unit
TRACON	Terminal Radar Approach Control Facility
TSD	Traffic Situation Display
UAV	Unmanned Aerial Vehicle
UPT	User Preferred Trajectory
URET	User Request Evaluation Tool
VDL-2	Very High Frequency Digital Link Mode 2
VFR	Visual Flight Rules
WARP	Weather and Radar Processor

FACILITY IDENTIFIERS

ACE	Central Regional Headquarters
AEA	Eastern Regional Headquarters
AGL	Great Lakes Regional Headquarters
ANM	Northwest Mountain Regional Headquarters
ASO	Southern Regional Headquarters
ATCSCC	David J. Hurley Air Traffic Control System Command Center
ATL	The William B. Hartsfield Atlanta International Airport
AWP	Western Pacific Regional Headquarters
BWI	Baltimore-Washington International Airport
DCA	Ronald Reagan Washington National Airport
DFW	Dallas-Fort Worth International Airport
EDW	Edwards Air Force Base
ELP	El Paso International Airport
EWR	Newark International Airport
IAD	Dulles International Airport
IAH	George Bush Intercontinental Airport / Houston Airport
IND	Indianapolis International Airport
JFK	John F. Kennedy International Airport
LAX	Los Angeles International Airport
LGA	LaGuardia Airport
MCI	Kansas City International Airport
MSP	Minneapolis-St. Paul International Airport
N90	New York TRACON
NORAD	North American Aerospace Defense Command
ORD	Chicago O’Hare International Airport
SEA	Seattle-Tacoma International Airport
SFO	San Francisco International Airport
SYR	Syracuse Hancock International Airport
ZAN	Anchorage ARTCC

ZAU	Chicago ARTCC
ZBW	Boston ARTCC
ZDC	Washington DC ARTCC
ZFW	Fort Worth ARTCC
ZHU	Houston ARTCC
ZID	Indianapolis ARTCC
ZKC	Kansas City ARTCC
ZNY	New York ARTCC
ZOA	Oakland ARTCC
ZOB	Cleveland ARTCC
ZTL	Atlanta ARTCC

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